lithium; it was also killed, and when the whole lens was burnt at once, no trace of lithium could be found. In the other, which had taken lithium, a piece of the lens, $\frac{1}{20}$th of a pin's head in size, showed the lithium; it had penetrated to the centre of the lens.

In another pig the same quantity of chloride of lithium was given, and in four hours even the centre of the lens contained lithium.

Another pig was given the same quantity, and it was killed in two hours and a quarter. The cartilage of the hip showed lithium faintly, but distinctly. The outer portions of the lens showed it slightly; the inner portions showed no trace.

To a younger pig the same quantity was given, and it was killed in thirty-two minutes. Lithium was found in the cartilage of the hip; in the aqueous humour; distinctly in the outer part of the lens, and very faintly in the inner part.

In an older and larger pig, to which the same quantity was given, lithium after one hour was found in the hip and knee joints very faintly; in the aqueous humour of the eye very distinctly; but none was found in the lens, not even when half was taken for one trial.

Chloride of rubidium in a three-grain dose was not satisfactorily detected anywhere. When 20 grains had been taken, the blood, liver, and kidney showed this substance; the lens when burnt all at once showed the smallest possible trace; the cartilages and aqueous humour showed none, probably because the delicacy of the spectrum-analysis for rubidium is very much less than that for lithium.

A patient who was suffering from diseased heart took some lithia-water containing 15 grains of citrate of lithia thirty-six hours before her death, and the same quantity six hours before death. The crystalline lens, the blood, and the cartilage of one joint were examined for lithium: in the cartilage it was found very distinctly; in the blood exceedingly faintly; and when the entire lens was taken, the faintest possible indications of lithium were obtained.

Another patient took lithia-water containing 10 grains of carbonate of lithia five hours and a half before death: the lens showed very faint traces of lithium when half the substance was taken for one examination; the cartilage showed lithium very distinctly.

I expect to be able to find lithium in the lens after operation for cataract, and in the umbilical cord after the birth of the fœtus.

I am, yours truly,

H. Bence Jones.

February 9, 1865.

Major-General SABINE, President, in the Chair.

Pursuant to notice given at the last Meeting, the Right Honourable Lord Dufferin was proposed for election and immediate ballot.

The proposal having been seconded, the ballot was taken, and Lord Dufferin was declared duly elected a Fellow of the Society.

The following communications were read :—

I. "Monthly Magnetical Observations taken at the College Observatory, Stonyhurst, in 1864." By the Rev. WALTER SIDGREAVES. Communicated, with a Note, by the President. Received January 24, 1865.

The Horizontal, Vertical, and Total forces are calculated to English measure, one foot, one second of mean solar time, and one grain being assumed as the units of space, of time, and of mass.

The Vertical and Total forces are obtained from the absolute measure of horizontal force and the Dip. The measures of the Dip-angle obtained with needle 2 have not been used in these calculations, as it appears from the observations taken with this needle that the position of its axle is less true than that of needle 1.

For the observations of Deflection and Vibration, taken each month for absolute measure of horizontal force, the same magnet has always been employed.

The moment of inertia of the magnet, with its stirrup, for different degrees of temperature, and the coefficients in the corrections required for the effects of temperature and of terrestrial magnetic induction on the magnetic moment of the magnet, were determined at the Kew Observatory by the late Mr. Welsh.

The moment of inertia of the magnet, with its stirrup, using the grain and foot as the units of mass and of linear measure, is 5·27303. Its rate of increase for increase of temperature is 0·00073 for every 10° of Fahr.

The weight of the magnet, with its stirrup, is approximately 825 grains, and the length of the magnet is nearly 3·94 inches. The moment of inertia was determined independently of the weight and dimensions, by the method of vibration with and without a known increase of the moment of inertia.

The temperature corrections have always been obtained from the formula $q(t_0-35°)+q'(t_0-35)^2$, where t_0 is the observed temperature and 35° Fahr. the adopted standard temperature. The values of the coefficients q and q' are respectively 0·0001128 and 0·000000436.

The induction coefficient μ is 0·000244.

The correction for error of graduation of the Deflection bar at 1·0 foot is $+$0·00004 ft., at 1·3 foot $+$0·000064 foot.

The observed times of vibration are entered in the Table without corrections.

The time of one vibration has been obtained each month from the mean of twelve determinations of the time of 100 vibrations.

The angles of deflection are each the means of two observations.

In deducing from these observations the ratio and product of the magnetic moment m of the magnet, and the earth's horizontal magnetic inten-

sity X, the induction and temperature corrections have always been applied, and the observed time of vibration has been corrected for the effect of torsion of the suspending thread; but no correction has been required for the rate of the chronometer, or for the arc of vibration, the former having been generally less than $1^{s}\cdot 0$, and the latter less than $50'$.

A twist of the torsion circle through $90°$ has ordinarily deflected the magnet through $10'$ of arc.

In the calculations of the ratio $\frac{m}{X}$, the third and subsequent terms of the series $1+\frac{P}{r^2}+\frac{Q}{r^4}+$ &c. have always been omitted. The value of the constant P was found to be $-0\cdot 00219$; this value being the mean of nine determinations obtained each from two pairs of deflection observations at

STONYHURST COLLEGE

Latitude 53° 50′ 40″. Longitude West of

TABLE of the Results of the Monthly

1864.	Abstract of Observations of Deflection and Vibration for absolute measure of Horizontal Force.									
Month.	Day and Hour.	Distance of Centres of Magnets.	Temperature.	Observed Deflection.	Log $\frac{m}{X}$.	Day and Hour.	Temperature.	Time of one vibration.	Log m. X.	Value of m.
	h m	foot.	°	° ′ ″		h m	°			
January ...	22nd... 2 0 p.m.	1·0	47·9	17 12 33	9·17175	21st ...11 30 a.m.	41·4	5·19981	0·28299	0·53379
February...	6th ... 1 0 p.m.	1·0	37·8	17 14 20	9·17183	6th ...11 0 a.m.	35·0	5·19158	0·28373	0·53429
March	12th ... 9 0 a.m.	1·0	41·4	17 13 42	9·17179	12th ... 2 0 p.m.	46·3	5·20921	0·28142	0·53286
April	11th ... 1 45 p.m.	1·0	55·7	17 3 29	9·16848	12th ... 6 0 p.m.	47·3	5·21762	0·27994	0·52995
	2 0 p.m.	1·3	56·0	7 40 55	9·16860	....	...	......	......	......
May	9th ... 5 45 p.m.	1·0	46·8	17 0 51	9·16688	9th ... 2 0 p.m.	57·7	5·22742	0·27933	0·52850
	„ 6 30 p.m.	1·3	45·5	7 39 47	9·16683	....	...	......	......	......
June	11th ... 6 0 p.m.	1·0	58·9	16 54 30	9·16508	11th ... 2 0 p.m.	63·5	5·24119	0·27766	0·52647
	„ 6 30 p.m.	1·3	58·4	7 36 59	9·16508	....	...	......	......	......
July	7th ... 6 15 p.m.	1·0	61·4	16 52 25	9·16439	7th ... 5 30 p.m.	69·0	5·23707	0·27827	0·52638
	„ 6 45 p.m.	1·3	60·0	7 36 1	9·16427	....	...	......	......	......
August	6th ... 9 15 a.m.	1·0	61·0	16 52 44	9·16449	5th ... 5 0 p.m.	61·3	5·24643	0·27656	0·52550
	„ 9 45 a.m.	1·3	62·8	7 36 13	9·16466	....	...	......	......	......
September	10th ...10 15 a.m.	1·0	58·3	16 51 49	9·16392	10th ... 9 0 a.m.	62·3	5·25863	0·27463	0·52386
	„ 10 30 a.m.	1·3	58·9	7 35 28	9·16367	....	...	......	......	......
October ...	7th ...11 15 a.m.	1·0	54·7	16 48 55	9·16246	7th ...10 0 a.m.	54·5	5·25965	0·27371	0·52253
	„ 11 45 a.m.	1·3	55·3	7 34 33	9·16255	....	...	......	......	......
November	8th ... 2 50 p.m.	1·0	45·4	16 48 25	9·16162	8th ... 2 0 p.m.	48·3	5·25466	0·27427	0·52229
	„ 3 0 p.m.	1·3	44·5	7 34 12	9·16148	....	...	......	......	......
December	15th ...12 15 p.m.	1·0	39·9	16 47 28	9·16087	15th ...11 0 a.m.	40·0	5·26192	0·27260	0·52093
	„ 12 30 p.m.	1·3	38·8	7 34 6	9·16103	....	...	......	......	......

m represents the magnetic moment of the Deflecting Magnet.
X represents the Earth's Horizontal Magnetic Intensity.

distances 1·0 and 1·3 foot. The value of P obtained in the preceding year was −0·00217.

The mean of the values of $\frac{m}{X}$, obtained each month from deflection observations at the two distances 1·0 and 1·3 foot, has been adopted for deducing the measure of horizontal force.

Observations taken to determine the position of the zero-point on the scale of the declination magnet, gave the same result as was obtained in 1859.

The discrepancies in the Declination observations may possibly be in a considerable degree occasioned by diurnal variation, as the observations varied in regard to the hour of the day; in future this will be avoided by making the observations always at a fixed hour. The discrepancies may also have been in part occasioned by magnetic disturbance which we have no present means of eliminating.

OBSERVATORY.

Greenwich $0^h\ 9^m\ 52^s{\cdot}68$. Height above Sea-level 381 feet.

Magnetic Observations for 1864.

Declination.		Magnetic Dip.			Absolute Measures. Values of			
Stonyhurst. Mean Time.	West Declination.	Day and Hour.	Needle.	Dip.	X, or Horizontal Force.	Y, or Vertical Force.	Φ, or Total Force.	Observer.
h m	° ′ ″	h m		° ′ ″				
29th ... 9 28 a.m.	21 52 35	21st ... 2 30 p.m.	1	69 47 21	3·5944	9·7634	10·4040	W.S
6th ... 9 45 a.m.	21 14 35	6th ... 9 0 a.m.	1	69 47 49	3·5971	9·7751	10·4160	„
18th ...10 34 a.m.	21 37 15	„ 3 30 p.m.	2	69 50 36	......	......	......	„
12th ... 6 0 p.m.	21 34 35	10th ... 9 0 a.m.	1	69 47 19	3·5877	9·7455	10·3849	„
18th ... 9 10 a.m.	21 37 30	....	...	....	......	......	......	„
12th ... 9 33 a.m.	21 59 0	11th ... 6 0 p.m.	1	69 45 32	3·5950	9·7582	10·3990	„
16th ... 9 20 a.m.	21 46 55	12th ... 9 0 a.m.	2	69 47 26	......	......	......	„
9th ... 9 15 a.m.	21 57 30	10th ... 8 30 a.m.	1	69 46 47	3·5995	9·7715	10·4134	„
....	....	„ 9 0 a.m.	2	69 46 32	......	......	......	„
18th ... 4 15 p.m.	22 15 0	11th ... 9 0 a.m.	1	69 48 47	3·5999	9·7951	10·4356	„
„ 6 0 p.m.	21 57 30	„ 9 30 a.m.	2	69 49 42	......	......	......	„
....	....	7th ... 3 30 p.m.	1	69 44 10	3·6055	9·7659	10·4102	„
....	....	....	...	....	......	......	......	„
6th ... 7 0 p.m.	22 1 40	5th ... 3 0 p.m.	1	69 44 40	3·5975	9·7420	10·3849	„
....	....	„ 3 30 p.m.	2	69 43 10	......	......	......	„
19th ... 5 39 p.m.	21 59 35	12th ... 9 30 a.m.	1	69 47 21	3·5927	9·7560	10·3963	„
20th ... 5 35 p.m.	22 6 10	27th ... 9 0 a.m.	1	69 46 40	......	......	......	„
10th ... 9 50 a.m.	22 23 40	6th ... 9 30 a.m.	1	69 46 47	3·5942	9·7402	10·3829	„
15th ... 9 0 a.m.	22 28 40	„ 10 0 a.m.	2	69 42 44	......	......	......	„
10th ... 9 0 a.m.	22 38 55	9th ... 8 30 a.m.	1	69 46 0	3·6004	9·7665	10·4090	„
„ 9 2 a.m.	22 36 40	„ 9 30 a.m.	2	69 45 36	......	......	......	„
16th ... 9 0 a.m.	22 38 0	15th ... 9 0 a.m.	1	69 46 23	3·5963	9·7600	10·4014	„
....	....	....	...	....	......	......	......	„
		Means for 1864.........		69 46 34	3·5967	9·7616	10·4031	

Note by the President.

Mr. Sidgreaves's observations, combined with those made at the same spot in 1858 in the course of the second magnetic survey of England, supply the materials for a first approximate deduction of the present amount of the secular change of magnetic dip and of the total magnetic Force at Stonyhurst.

Commencing with the Dip:—the results in 1858 were as follows (Brit. Assoc. Reports, 1861, pp. 253 & 254):—

				°	′	″	
Sept. 20.	Kew Circle No. 30.	Needle 1	....	70	0	12	Rev. W. Kay.
Nov. 2.	Kew Circle No. 32.	Needle 1	....	69	57	44	Rev. A. Weld.
,, 14.	,,	,,	....	70	3	30	,,
,, 14.	,,	,,	....	70	4	21	,,
Mean: corresponding in date to 1858.8			....	70	1	27	

And by the present Observations, corresponding in date to 1864.5	69	46	34
Difference, corresponding to 5.7 years		14	53

whence we have an annual secular decrease of 2′·614; mean epoch 1861.9.

In a memoir presented to the Royal Society in 1861, "On the Secular Change of the Dip in London between 1821 and 1860," printed in vol. xi. of the 'Proceedings,' pp. 144–162, the mean annual secular decrease of the dip in the years from 1821.65 to 1859.5 is stated to have been 2′·69, mean epoch 1840.6; and in the 21.2 years between 1838.3 and 1859.5, 2′·63; mean epoch 1848.9.

Proceeding to the Total Force:—its value obtained by myself at Stonyhurst by experiments of deflection and vibration with the Survey Collimator No. 5, in October 1858 was 10·385 in British units (Brit. Assoc. Reports, 1861, pp. 264, 268); and by the experiments of Mr. Sidgreaves with the apparatus belonging to Stonyhurst College (originally obtained from Kew), its mean value in 1864, derived from the twelve monthly determinations, was 10·4031; the difference is ·0181 in 5.75 years, or an annual increase of 0031. To compare with this, we have the statement in the British Survey (Brit. Assoc. Reports, 1861, p. 273), that from the absolute measures made monthly at Kew between April 1857 and March 1862 the total force had increased at Kew during that interval at an average annual rate of ·0025. In the same memoir it was also inferred, from a general comparison of the isodynamic lines in the first and second British Surveys, that along a line drawn in a N.W. and S.E. direction the secular change would be found contemporaneously somewhat greater at a northern or north-western station than at a southern or south-eastern station—greater therefore at Stonyhurst than at Kew. The general fact that the value of the total force in Britain is progressively increasing, may be inferred alike by the observations at Kew and at Stonyhurst; the precise amount of the annual increase at either station will require a longer continuance of the same careful and systematic observations as those at Kew and Stonyhurst.